

REMARKS

Applicants respectfully request entry of the foregoing amendments to Claims 1, 2, 4, 10, 11, 12, 14 and 26 prior to further examination. Claims 1-4 and 9-27 are pending in the application. No claim has been allowed. Claims 2, 4, 10 and 12 have been amended to provide proper antecedent basis. Claims 1, 11, 14 and 26 have been amended to recite the additional limitation "a subwavelength moth-eye structure." Support for these amendments may be found at least at page 6, line 10 and page 15, line 25 of the application as filed December 4, 2003. No new matter is introduced by way of these amendments.

Presently Claimed Invention

The present invention provides a subwavelength optical microstructure, such as a linear moth-eye structure, formed on a substrate. As provided in the specification, moth-eye structures are explained in more detail in U.S. Application No. 09/438,912, now issued as U.S. Patent 6,356,389 on March 12, 2002, the teachings of which were incorporated in their entirety in the application filed December 4, 2003. In one embodiment, the moth-eye structure is formed from the same material as the substrate. The moth-eye structure can be formed, for example, through embossing, molding, or casting. In another embodiment, the moth-eye structure is formed from a material having a different index of refraction than the substrate. See application, page 5, lines 5-12.

The structure is sinusoidal in appearance and can provide a deep green to deep blue color when viewed at grazing angles of incidence. If the period (P) is made to be about 180 nm or less, this color will not be present. In one embodiment, the amplitude is about three times the period to provide a three to one aspect ratio. See application, page 5, 18-21.

A moth-eye anti-reflection surface is one in which the reflection of light is reduced by the presence of a regular array of small protuberances covering the surface. The spacing of the protuberances is less than the wavelength of light for which anti-reflection is sought. A moth-eye surface can be understood in terms of a surface layer in which the refractive index varies gradually from unity to that of the bulk material. Without such a layer, the Fresnel reflection coefficient at an interface of two media is equal to $((n_1 - n_2)/(n_1 + n_2))^2$, where n_1 and n_2 are

the refractive indices of the media. However, if there is a gradual change of index, net reflectance can be regarded as the result of an infinite series of reflections at each incremental change in index. See application, page 6, lines 8-16.

For a given moth-eye surface, where the height of the protuberances is h and the spacing is d , the reflectance is expected to be very low for wavelengths less than about $2.5h$ and greater than d at normal incidence, and for wavelengths greater than $2d$ for oblique incidence. See application, page 7, lines 9-12.

The moth-eye effect should not be confused with that of reducing the specular reflectance by roughening. Roughness merely redistributes the reflected light as diffuse scattering and degrades the transmitted wavefront. See application, page 7, lines 15-17.

Regarding Objections to the Specification

The Examiner has objected to the specification as failing to provide proper antecedent basis in claims 2, 4, 10 and 12 for “the light-transmissive inhibiting surface.” These claims have been amended to contain the same amendment made in the amendment filed December 12, 2005 to provide a proper antecedent basis. Claims 2, 4, 10 and 12 now recite “the intermittent light-transmissive blocking surface.” No new matter is introduced by way of these amendments.

Regarding Rejections Under 35 U.S.C. §102

Claims 1-4 have been rejected under 35 U.S.C. §102(b) as being anticipated by Ito (Japanese Patent Publication JP 11-84129).

Ito discloses a sheet-like polarizing film having rows of parallel prisms to polarize light emitted from a source to a liquid crystal display. Each right-triangle-like prism includes a slanted surface and a perpendicular surface. In no instance does Ito teach or suggest a subwavelength optical microstructure, such as a moth-eye structure, or impressing a sinusoidal pattern on prism peaks that provides a moth-eye structure.

It is well accepted that a claim is not anticipated under 35 U.S.C. § 102 unless each and every aspect of the claimed invention is taught by a single reference. The Examiner has the burden of showing that a claimed invention is anticipated by pointing out particular references to cited prior art.

In the latest office action mailed March 13, 2006, the Examiner has broadly cited several figures to reject the claimed invention without specifically pointing to text that would anticipate the claimed invention. The Examiner has the burden of pointing to specific text and provide explained reasoning that supports a rejection and not make broad conclusory statements about same.

However, even the broadest interpretation of the cited figures does not teach the elements of the claimed invention. For example, none of the cited figures in Ito teaches or suggests “a moth-eye structure.” Therefore, Ito does not teach or suggest “a moth-eye structure” as claimed in Claim 1 because Ito does not include this feature.

In addition, Ito does not teach or suggest an “subwavelength” structure at all, never mind one that has a moth-eye pattern.

Claims 2-4 are dependent upon Claim 1 and therefore contain all the limitations of the base claim. It is respectfully submitted that the invention as recited in Claims 1-4 is not anticipated because it includes distinguishing limitations not taught or suggested by Ito.

Independent Claims 9, 13, 14, 24, and 26 are allowable for the same reasons. Claims 10, 12, 23 and 27 are dependent upon independent Claims 9, 11, 14 and 26, respectively, and therefore contain all the limitations of their base claims. Applicant respectfully requests the withdrawal of the rejections of Claims 1-4, 9, 10, 13, 14, 23, 24, 26 and 27 under 35 U.S.C. §102(b).

Claims 1-3 have been rejected under 35 U.S.C. §102(a) as being anticipated by Maruyama (Japanese Patent Publication JP 2000-221324).

Maruyama discloses a geometric structure face including a plurality of prism faces formed on the interface between an isotropic layer and an anisotropic layer. In no instance does Maruyama teach or suggest a subwavelength optical microstructure, such as a moth-eye structure, or impressing a sinusoidal pattern on prism peaks that provides a moth-eye structure.

It is well accepted that a claim is not anticipated under 35 U.S.C. § 102 unless each and every aspect of the claimed invention is taught by a single reference. The Examiner has the burden of showing that a claimed invention is anticipated by pointing out particular references to cited prior art.

In the latest office action mailed March 13, 2006, the Examiner has broadly cited several figures to reject the claimed invention without specifically pointing to text that would anticipate the claimed invention. The Examiner has the burden of pointing to specific text and provide explained reasoning that supports a rejection and not make broad conclusory statements about same.

However, even the broadest interpretation of the cited figures does not teach the elements of the claimed invention. For example, none of the cited figures in Maruyama teaches or suggests “a moth-eye structure.” Therefore, Maruyama does not teach or suggest “a moth-eye structure” as claimed in Claim 1 because Maruyama does not include this feature.

In addition, Maruyama does not teach or suggest and “subwavelength” structure at all, never mind one that has a moth-eye pattern.

Claims 2 and 3 are dependent upon Claim 1 and therefore contain all the limitations of the base claim. It is respectfully submitted that the invention as recited in Claims 1-3 is not anticipated because it includes distinguishing limitations not taught or suggested by Maruyama.

Independent Claims 9, 13, 14 and 26 are allowable for the same reasons. Claims 10, 12, 23 and 27 are dependent upon independent Claims 9, 11, 14 and 26, respectively, and therefore contain all the limitations of their base claims. Applicant respectfully requests the withdrawal of the rejections of Claims 1-3, 9-14, 23, 26 and 27 under 35 U.S.C. §102(a).

Claims 11 and 12 have been rejected under 35 U.S.C. §102(b) as being anticipated by Francis (US Patent No. 3,291,871).

Francis discloses a method whereby the height of the wires of a fine wire graid is constructed by shadowing the peaks of a corrugated substrate. The term “corrugated substrate” is used to describe any substrate which has a surface formed of periodically recurring peaks and valleys whereby the peaks may be rounded or sharp. In no instance does Francis teach or suggest a subwavelength optical microstructure, such as a moth-eye structure, or impressing a sinusoidal pattern on prism peaks that provides a moth-eye structure.

It is well accepted that a claim is not anticipated under 35 U.S.C. § 102 unless each and every aspect of the claimed invention is taught by a single reference. The Examiner has the

burden of showing that a claimed invention is anticipated by pointing out particular references to cited prior art.

In the latest office action mailed March 13, 2006, the Examiner has broadly cited several figures to reject the claimed invention without specifically pointing to text that would anticipate the claimed invention. The Examiner has the burden of pointing to specific text and provide explained reasoning that supports a rejection and not make broad conclusory statements about same.

However, even the broadest interpretation of the cited figures does not teach the elements of the claimed invention. For example, none of the cited figures in Francis teaches or suggests “a moth-eye structure.” Therefore, Francis does not teach, suggest, or otherwise make obvious “a moth-eye” structure as claimed in Claim 11 because Francis does not include this feature.

In addition, Francis does not teach or suggest any “subwavelength” structure at all, never mind one that has a moth-eye pattern.

Claim 12 is dependent upon Claim 11 and therefore contains all the limitations of the base claim. It is respectfully submitted that the invention as recited in Claims 11 and 12 is not anticipated because it includes distinguishing limitations not taught or suggested by Francis. Applicant respectfully requests the withdrawal of the rejections of Claims 11 and 12 under 35 U.S.C. §102(b).

Regarding Rejections Under 35 U.S.C. §103

Claims 15-22 have been rejected under 35 U.S.C. §103 as being unpatentable over Maruyama (Japanese Patent Publication JP 2000-221324).

The Examiner’s argument is not persuasive because the general conditions of the claims are not disclosed in the prior art. Maruyama does not disclose a subwavelength optical microstructure, such as a moth-eye structure. Rather, Maruyama discloses a geometric structure face including a plurality of prism faces formed on the interface between an isotropic layer and an anisotropic layer. In no instance does Maruyama teach or suggest a subwavelength optical microstructure, such as a moth-eye structure, or otherwise impressing a sinusoidal pattern on prism peaks that provides a moth-eye structure.

The Examiner has the burden of establishing a prima facie case of obviousness by providing evidence in the cited art or in the knowledge generally available to one of ordinary skill in the art to support the contention that there was both a suggestion and a reasonable expectation of success in the cited art.

To establish prima facie obviousness of a claimed invention all the claim limitations must be taught or suggested by the prior art. The Examiner must provide evidence of some suggestion or motivation to modify the reference or to combine reference teachings.

The Examiner has not met the statutory burden to establish a prima facie case of obviousness. The Examiner has not provided any evidence to support the contention that there was both a suggestion in the cited art to modify the prior art to arrive at Applicant's claimed invention, nor has the Examiner pointed out where each of the claimed elements is taught or suggested in the cited art.

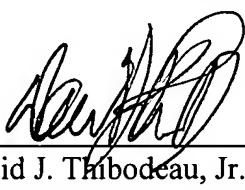
It is respectfully submitted that the invention as recited in Claims 15-22 is not rendered obvious because it includes distinguishing limitations not taught or suggested by Maruyama. Applicant respectfully requests the withdrawal of the rejections of Claims 15-22 under 35 U.S.C. §103.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By 

David J. Thibodeau, Jr.
Registration No. 31,671
Telephone: (978) 341-0036
Facsimile: (978) 341-0136

Concord, MA 01742-9133

Dated:

9/13/06